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Intelligent transport systems — Wide area communication — Protocol management information

Systèmes de transport intelligents — Communication étendue — Protocole de gestion de l'Information

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15662 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

Introduction

Most of the application services in the ITS sector use a variety of wide area communication systems in order to connect user terminals and “Service Centres”. In addition, the application services that are currently being provided connect specific user terminals to specific service centres using specific wide area communications systems. In other words, the various conditions that must be established to provide services are fixed. However, when the future modes of service use are considered, it is assumed that a user will utilize the same terminal to access “Service Centre A” in some cases and “Service Centre B” in other cases. It can also be assumed that in some cases the user may be on foot and in others he or she may be travelling in a vehicle. It can also be assumed that some users may access the service centre from “smart phones”, while others may do so from navigation systems, while still others may do so using interactive TVs.

When a variety of user terminals use a variety of wide area communications systems to connect to a variety of service centres in this manner, the type and content of the conditions that must be established will differ for each individual service usage. In order to provide appropriate service based on these conditions, it is crucial to establish a mechanism by which the type of conditions and the content established for them are transmitted to an appropriate entity and interpreted.

This International Standard summarizes information as a checklist to consider internal processing in communication systems, terminals and so forth (“protocol management information”) suitable for providing ITS application services utilizing wide area communication systems.

Intelligent transport systems — Wide area communication — Protocol management information

1 Scope

This International Standard provides information as a checklist to consider handling messages that are defined by the application working groups of ISO/TC 204, installing systems and selecting suitable wide area communication systems for providing ITS application services.

The usages of this information are for frameworks of message headers, pay load items for initializing communication links, checklists for system design and so on. Thus, these information items are not necessarily contained in message instances and/or headers that are actually transmitted.

For example, this information is used to organize the characteristics of messages such as those requesting hand-over based on the relationship between the size of the information service area and the communication range of each communication system (see Figure 1).

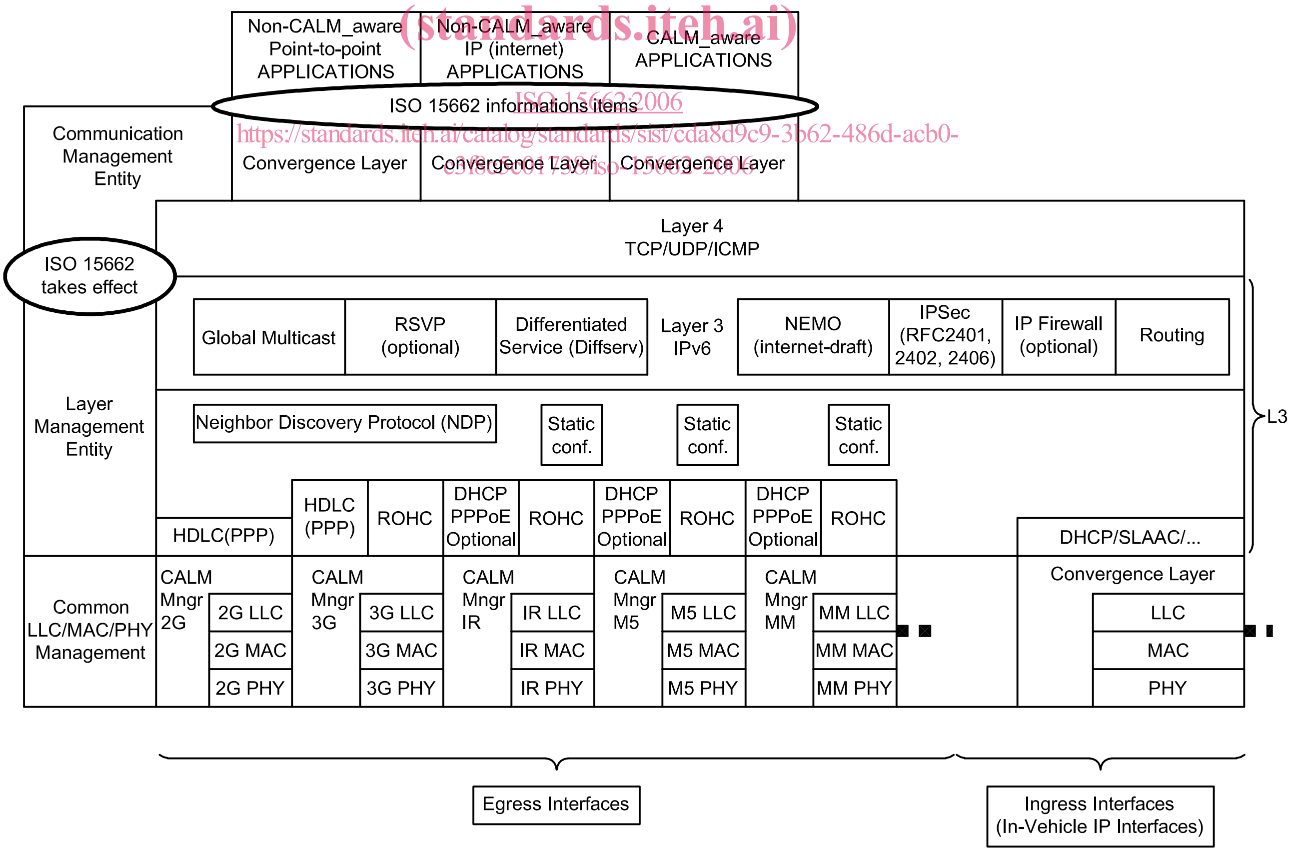

Non-CALM_aware Point-to-point APPLICATIONS
Non-CALM_aware IP (internet) APPLICATIONS
CALM_aware APPLICATIONS
ISO 15662 informations items
Communication Management Entity
Convergence Layer
Convergence Layer
Convergence Layer
Layer 4 TCP/UDP/ICMP
ISO 15662 takes effect
Global Multicast
RSVP (optional)
Differentiated Service (Diffserv)
Layer 3 IPv6
NEMO (internet-draft)
IPSec (RFC2401, 2402, 2406)
IP Firewall (optional)
Routing
L3
Layer Management Entity
Neighbor Discovery Protocol (NDP)
Static conf.
Static conf.
Static conf.
HDLC(PPP)
HDLC (PPP)
ROHC
DHCP PPPoE Optional
ROHC
DHCP PPPoE Optional
ROHC
DHCP PPPoE Optional
ROHC
DHCP/SLAAC/...
Common LLC/MAC/PHY Management
CALM Mngr 2G
2G LLC
2G MAC
2G PHY
CALM Mngr 3G
3G LLC
3G MAC
3G PHY
CALM Mngr IR
IR LLC
IR MAC
IR PHY
CALM Mngr M5
M5 LLC
M5 MAC
M5 PHY
CALM Mngr MM
MM LLC
MM MAC
MM PHY
Convergence Layer
LLC
MAC
PHY
Egress Interfaces
Ingress Interfaces (In-Vehicle IP Interfaces)

Figure 1 — Scope of 15662 (in the architecture of ISO/TC 204/WG 16)

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14817, *Transport information and control systems — Requirements for an ITS/TICS central Data Registry and ITS/TICS Data Dictionaries*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14817 and the following apply.

3.1
protocol management information
information as a checklist to consider handling messages that are defined by the application working groups of ISO/TC 204, installing systems and selecting suitable wide area communication systems for providing ITS application services

NOTE Protocol management information items are not necessarily contained in message instances and/or headers that are actually transmitted.

4 Requirements for protocol management information items

Protocol management information is defined as follows and its structure is described in Annex A. Each item is defined in the abstract, so it does not specify location and time reference manner, granularity and so on. If some service providers use them for message headers, they shall define the code strictly.

4.1 Selection of communication system

This information is for selecting the wide area communication system to be used for the response in accordance with the requirements for executing the application service, the usage environment of the service user, the status of the user terminal and so forth.

4.1.1 Responsiveness

4.1.1.1 Descriptive name

```
ProtocolManagementInformation. responsiveness
```

4.1.1.2 ASN.1 object identifier

```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) responsiveness(1)}
```

4.1.1.3 Definition

This information represents the response speed and allowed delay time while receiving services in terms of whether response will take place in real time and how much delay time will be allowed.

In cases where response time is conditioned for executing application services, the wide area communication system shall be selected in accordance with the required response time, and this information can be used to make such assessment. Furthermore, in case of receiving information in an “on demand” mode, this information indicates the time from request until reception, for emergency bulletins, it indicates the time until the information reaches the other party, and for transportation support and the like, it indicates the time until forward road status, pavement status or other services are completed.

The following depict some examples of categories:

— Within 1 second,

— Within 30 seconds,

— Within 1 minute,

— Within 15 minutes,

— 15 minutes or longer.

In addition, the required response time may be concretely specified as necessary.

4.1.1.4 Descriptive name context

“Protocol management information”.

4.1.1.5 Data concept type

Data element concept.

4.1.2 Directionality

4.1.2.1 Descriptive name

`ProtocolManagementInformation. directionality`

4.1.2.2 ASN.1 object identifier


```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) directionality(2)}
```

4.1.2.3 Definition

This information indicates the combinations of unidirectional or bidirectional and symmetric or asymmetric with respect to transmission and reception of information.

In cases where the directionality of communications (unidirectional, interactive, etc.) is needed to execute application services, the wide area communication system shall be selected in accordance with the type of communication (unidirectional or bidirectional, symmetric or asymmetric), and this information can be used to make such assessment. Furthermore, interactive indicates cases where a response is expected to a given message, while unidirectional indicates cases where a response is not expected to a message.

The following depict combination examples:

— Unidirectional: In the case of an uplink, this corresponds to information provided from the vehicle such as emergency bulletins. In the case of a downlink, it corresponds to cases in which the service user cannot (or does not need to) make a request in order for the service provider to make the decision to start service.

— Interactive-symmetric: When service begins in response to a request from the service user and the amount of data being transmitted and data being received is almost equal.

— Interactive-asymmetric (large uplink): When service begins in response to a request from the service user and when the amount of data being transmitted is greater than the amount of data being received.

— Interactive-asymmetric (large downlink): When service begins in response to a request from the service user and when the amount of data being received is greater than the amount of data being transmitted.

4.1.2.4 Descriptive name context

“Protocol management information”.

4.1.2.5 Data concept type

Data element concept.

4.1.3 Usage environment

4.1.3.1 Descriptive name

```
ProtocolManagementInformation. usageEnvironment
```

4.1.3.2 ASN.1 object identifier

```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) usageEnvironment(3)}
```

4.1.3.3 Definition

This information represents the combination of the means of transportation when using services and the speed of movement when receiving services.

Depending on the usage environment of the service user, the requirements for responsiveness and directionality may not be met in some cases. For this reason, the wide area communication system shall be selected in accordance with the means of transportation, speed of movement and other usage environment factors, and this information can be used for making such assessment.

The following depict examples of categories by means of transportation:

— Vehicle: In the case of driving a vehicle;

— Public transportation: In the case of riding on public transportation;

— Pedestrians: In the case of being on foot or on a bicycle;

— Other categories: Bicycle, Motorcycle, Moped, Car, Truck, Emergency vehicle, Bus, Tram, Train, Ferry, Taxi, etc.

The following indicate examples of categories by speed of movement:

— Fast: In the case of travelling on expressways, case of travelling on a railroad (60-350 km/h);

— Medium speed: In the case of travelling on ordinary roads (20-60 km/h);

— Slow: In the case of travelling slowly at speeds at which it is possible to stop quickly (less than 20 km/h);

— Stopped: In the case of not being in motion.

In addition, the speed may be more precisely specified as necessary.

4.1.3.4 Descriptive name context

“Protocol Management Information”.

4.1.3.5 Data concept type

Data element concept.

4.1.4 Service (provision) area

4.1.4.1 Descriptive name

`ProtocolManagementInformation. serviceArea`

4.1.4.2 ASN.1 object identifier

```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) serviceArea(4)}
```

4.1.4.3 Definition

This information represents the range/areas at which users receive services and the need for continuity.

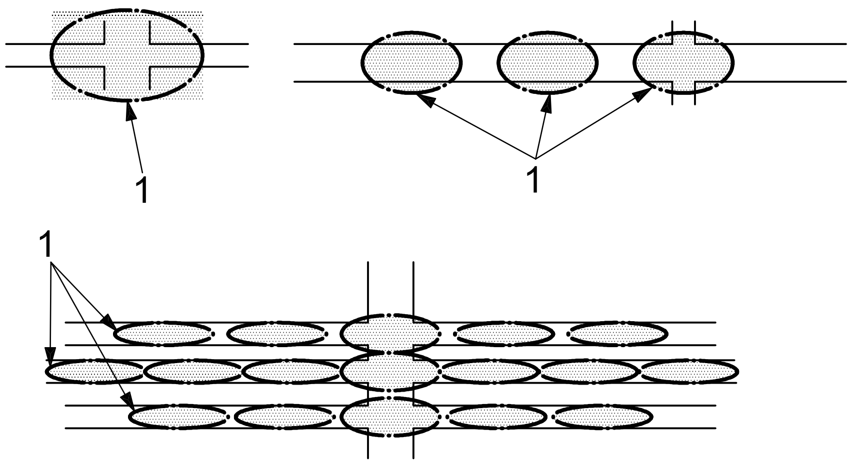
In cases where a service area and the continuity of this area and other conditions are required to use application services, the wide area communication system shall be selected to match the areas in which service can be provided, and this information can be used to make such assessment.

The following depict examples of categories for continuity:

— Continuous area designation: When the area in which service is provided shall be continuous and users shall be able to use the service anywhere (this can be broken down into two types: "area-wide continuity" covering an entire area and "linear continuity" limited to a specific route);

— Non-continuous: When service can only be used in specific non-continuous locations.

In addition, positional information of the range and areas at which services are provided are specified as the range/areas (see Figure 2).



Key

1 area in which service is provided

Figure 2 — Service provision areas

4.1.4.4 Descriptive name context

“Protocol management information”.

4.1.4.5 Data concept type

Data element concept.

4.1.5 Service (provision) time

4.1.5.1 Descriptive name

```
ProtocolManagementInformation. serviceTime
```

4.1.5.2 ASN.1 object identifier

```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) serviceTime(5)}
```

4.1.5.3 Definition

This information represents the information service starting time, service ending time and the continuity of service time.

When the conditions relating to communication connection time for use of application services are required, the wide area communication system must be selected to match the service time, and this information can be used to make such assessment.

The following depict examples of categories:

— Start and end times: In the case of specifying the times that information service starts and ends;

— Start time: In the case of specifying the time that information service starts;

— End time: In the case of specifying the time that information service ends;

— Continuous: In the case of specifying that information is provided continuously.

In addition, time is also specified as necessary.

4.1.5.4 Descriptive name context

“Protocol management information”.

4.1.5.5 Data concept type

Data element concept.

4.1.6 Bandwidth

4.1.6.1 Descriptive name

```
ProtocolManagementInformation. bandwidth
```

4.1.6.2 ASN.1 object identifier

```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) bandwidth(6)}
```

4.1.6.3 Definition

This information represents the transmission ability in terms of the transmission capacity and format (text, audio, simple graphic, still image, video) required by the information to be provided.

Depending on the amount of information to be transmitted and the format of the data involved in the use of application services, the conditions for responsiveness and data format, etc. may not be satisfied in some cases. Accordingly, the wide area communication system shall be selected to match the transmission capacity, data format and other aspects of transmission ability, and this information can be used to make such assessment.

The following depict examples of describing transmission capacity and data format:

— Transmission capacity: Described according to the required transmission speed (bps);

— Format: Text, audio, simple graphic, still image, video, other special format which can describe the data volume.

4.1.6.4 Descriptive name context

“Protocol management information”.

4.1.6.5 Data concept type

Data element concept.

4.1.7 Connection cost

4.1.7.1 Descriptive name

```
ProtocolManagementInformation. connectionCost
```

4.1.7.2 ASN.1 object identifier

```
{iso(1) standard(0) iso15662(15662) protocolManagementInformation(1)
selectionOfCommunicationSystem(1) connectionCost(7)}
```

4.1.7.3 Definition

This information represents the communication cost requirements for providing information.

When conditions relating to communication connection costs (upper limit, etc.) for use of application services are required, the wide area communication system shall be selected to match the cost requirements, and this information can be used to make such assessment.

The following depict examples of categories:

— Upper limit specification: Case of specifying an upper limit price of the total cost value of communication;

— Unit price upper limit specification: Case of specifying the upper limit of the unit price of communication costs (in communication time units or transmitted information volume units).

In addition, the upper limit cost is specified as necessary.